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THE BURROW-BUILDER AND ITS USE FOR CONTROL OF POCKET GOPHERS

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SPECIAL SCIENTIFIC REPORT: WILDLIFE No. 47

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

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THE BURROW-BUILDER AND ITS USE FOR CONTROL OF POCKET GOPHERS

by

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UNITED STATES
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ABSTRACT

Improvement of methods of controlling pocket gophers has long been needed by farmers, ranchers, and others engaged in agriculture. A new approach, one using a machine called a "burrow-builder" has been developed. This equipment, attached to a tractor, constructs artificial gopher runways at controlled depths below the surface of the ground and mechanically places bait in the runways. Tests in Colorado have shown the high potential this approach and equipment have in controlling both the plains pocket gopher (Geomys bursarius) and the mountain pocket gopher (Thomomys talpoides). The method and machine may also have application in the control of other rodents.

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INTRODUCTION

Previous pocket gopher control techniques have required hard manual labor whereby the operator generally has had to probe for underground runways and place bait, all by hand. The "burrow-builder" offers a mechanized method by which the operator constructs and baits an artificial gopher runway in one operation. This method allows the gopher to find the control agent.

The purpose of this report is to describe the "burrow-builder," how it operates, the results that have been obtained so far in tests, and to list other possible applications.

ACKNOWLEDGMENTS

The Bureau of Sport Fisheries and Wildlife had previously designed machines for constructing artificial trails for control of mice in orchards. This led to the idea of using a similar technique for pocket gopher control. Dr. Walter E. Howard of the University of California has informed us that he also has experimented with a machine designed to bait pocket gophers underground.

The "burrow-builder" has been developed as a part of the Colorado Cooperative Pocket Gopher Project, which is a joint research program of the Forestry and Range Management Section of Colorado State University, the Rocky Mountain Forest and Range Experiment Station of the U.S. Forest Service, and the Denver Wildlife Research Center of the Bureau of Sport Fisheries and Wildlife. The Colorado Cattlemen's Association has actively supported the program.

Much credit is due personnel of the hydraulics laboratory, Colorado State University, Fort Collins, Colorado, for their assistance in constructing the first machine. Their technical knowledge in methods of construction was of great value. The efforts of Ancel M. Johnson and Paul L. Hegdal of the Denver Wildlife Research Laboratory in field testing the equipment are also gratefully acknowledged.

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Construction

The "burrow-builder" (figures 1 and 2) is made up of three basic pieces of machinery: (1) A Ford 32" x 4" x 4" model 108-1 tool carrier bar with one 24-inch subsoiler shank less chisel and boot, equipped with an 18-inch coulter disc and frame; (2) one Demster corn can with standard bottoms, and one large whole center drop plate equipped with one #5-302 press wheel drive assembly less press wheel; and (3) two wheel assemblies, including axles, spacers, cup, and two 4" x 8" tires and tubes.

Torpedo

The torpedo, which is 2½ inches in diameter and 20 inches long, forms the burrow and facilitates the placement of the bait. It is made of hard steel and is attached to the bottom of the subsoiler shank; the front end is solid and hard-surfaced to resist wear. The torpedo is sloped at a 60-degree angle to give it "bite" and to hold the machine in the ground. Its cylinder has a hole through the midsection where the feeder tube connects, and is open on the posterior underside to provide an outlet for the bait.

Bait-Feeding Mechanism

A Demster corn can is mounted on the rear of the subsoiler, and a two-wheel assembly is fastened to the can by means of metal supports and a chain drive. The wheel assembly is mounted over the rear of the torpedo in a position to pack the soil over the cylinder and serve as a drive for the feeding mechanism. The Demster can is connected by a flexible hose to a built-on feeder tube on the back of the subsoiler shank. A small plexiglass section is inserted at the base of the can to enable the operator to check on bait feeding. By changing the position of the two bolts that hold the feeder mechanism to the subsoiler, the depth the torpedo penetrates in the ground can be regulated from 4 to 16 inches. The flexible tube connecting the can to the tube on the back of the subsoiler shank will lengthen or shorten to permit a continuous flow of bait as the depth of the torpedo is changed.

The subsoiler attachments are standard for any tractor with a hydraulic three-point hitch. The adjustable third link that is fastened to the top of the subsoiler and to the middle of the tractor must be 30-3/8 inches long at midadjustment. A standard Ford link has to be lengthened about five inches to be usable. Figure 3 is a detailed drawing of the machine.

Costs

The above parts cost $291.13, and labor and additional materials amounted to $178.81. The total cost of a "burrow-builder" was $469.94 but this could be reduced to approximately $450.00 if a number of machines were to be made. This price was quoted by Schneidmiller Industries, 334 East Mountain Avenue, Fort Collins, Colorado.

Operation

The "burrow-builder" is designed to construct an artificial burrow and bait it with poison baits in one operation. For effective use in pocket gopher control, a number of adjustments must be made. The depth of gopher runways first must be determined by measuring existing burrows, and the machine then must be set at the desired depth. A few short trial runs should be made and the top link adjusted so that the machine rides the ground with the wheels barely packing the soil. If the "bite" of the torpedo is too great, the wheels start dragging dirt; if the "bite" is too little, the torpedo will not stay in the ground.

The condition of the soil has to be such that a good burrow can be made. This usually means that there is enough moisture in the soil to make it firm into a pack when squeezed in the hand.

Pocket gophers inhabit areas from sea level to the tops of our highest western mountains, and are found in both agricultural and rangelands. The "burrow-builder" can be used for control of gophers in any area where soil conditions and the physical aspect of the land make it possible to drive over the area with a tractor and construct a good artificial burrow.

In order to make a good burrow it is necessary that the soil is moist. In the arid West this condition can usually be found in the spring or fall of the year.

The effectiveness of the "burrow-builder" is dependent upon the gophers finding the artificially-constructed runway and using it long enough to find the poisoned bait. In order to make this possible, the artificial burrows are constructed at a depth so as to intercept the greatest number of natural gopher tunnels (figure 4). This will vary with soil conditions and the species of gopher being controlled. The distance between artificial burrows across an area is determined by density of gophers and the species involved (figure 5).

What Has Been Done

The machine has been field-tested against the plains pocket gopher (Geomys bursarius) in alfalfa fields in Weld County, Colorado. All tests were conducted in the spring of 1959 when the sandy-loam soil was moist. Gopher populations were estimated to be 10 to 15 animals per acre. A good artificial burrow was constructed at a depth of 9 inches, and the interval between these burrows across the field was 25 to 30 feet. Between 3 and 4 pounds of bait were used on each acre and the average treatment time was 10 minutes. At this rate, one man could treat approximately 50 acres per day at a cost of $1.50 per acre (80 cents for bait, 30 cents for labor, and 40 cents for rental of tractor). Under these conditions 90 to 100 percent control was obtained.

Baits used in these tests were formulations of Compound 1080 and milo maize, and strychnine and milo maize with the addition of a small quantity of Erigeron extract to increase acceptance. Recommended baits for use in the "burrow-builder" may be obtained by contacting district offices of the Branch of Predator and Rodent Control.

Soil conditions in the mountains of Colorado during the summer of 1959 generally were too dry for efficient use of the "burrow-builder," so tests involving the mountain pocket gopher (Thomomys talpoides) were carried out in October in mixed alfalfa-grass hayfields in Larimer County. The soil, moistened by recent rains, was a sandy-clay-loam type with some rocks. Gopher populations were estimated to be 10 to 15 per acre. A good artificial burrow was constructed at a depth of 6 inches, and the interval between these burrows across the field was 20 to 25 feet. About three pounds of bait were used on each acre. Under these conditions 85 to 100 percent control was obtained.

Baits used in the tests on mountain gophers were formulations of Compound 1080 and whole oats. The whole oats were found to be more acceptable to these gophers in laboratory tests.

There were no accidental or secondary poisonings in any of the test areas even though baits were exposed within 100 yards of farm dwellings. Dogs were frequently observed in the baited areas. Crop damages due to the operation were negligible, and no objections from the landowners were registered.

Tractors used with good results were: Ford, Massey Ferguson, John Deere Model 430 and 720 diesel. Under most field conditions the Model 430 John Deere, or any other tractor with equal power, would be best.

Possible Applications

Other possible uses of the "burrow-builder" would be in controlling other rodents. Such rodents as kangaroo rats, grasshopper mice, ground squirrels, meadow mice, and deer mice have been found dead in the artificially constructed burrows; however, the machine has not been tested against these animals.

It is also likely that fresh-cut, root-type baits, such as carrots, could be used in the machine. Carrots diced to 3/8 inch have passed through the feeding mechanism without plugging. Work is being done to perfect this procedure.

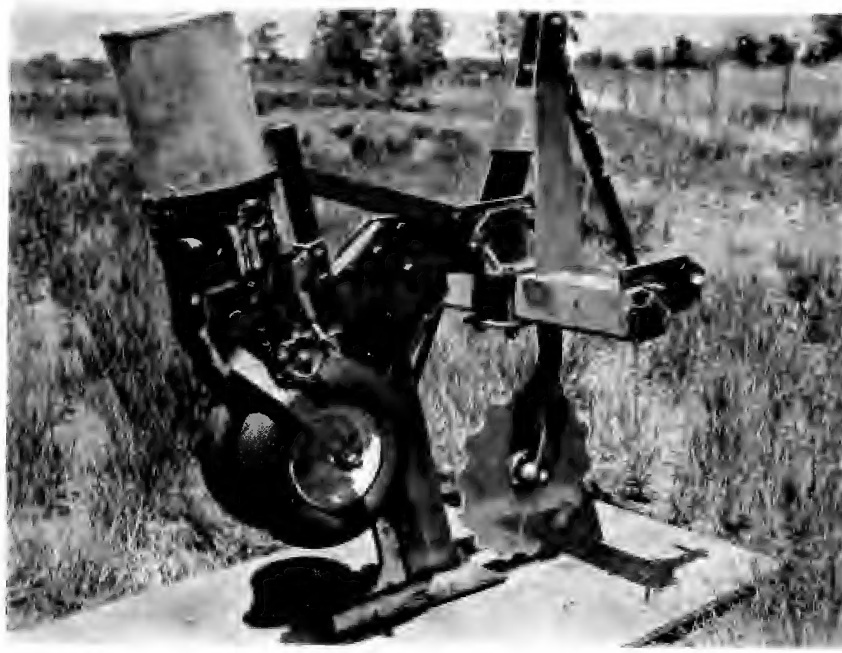

Figure 1.--Burrow-builder.

Figure 2.--Burrow-builder in operation.

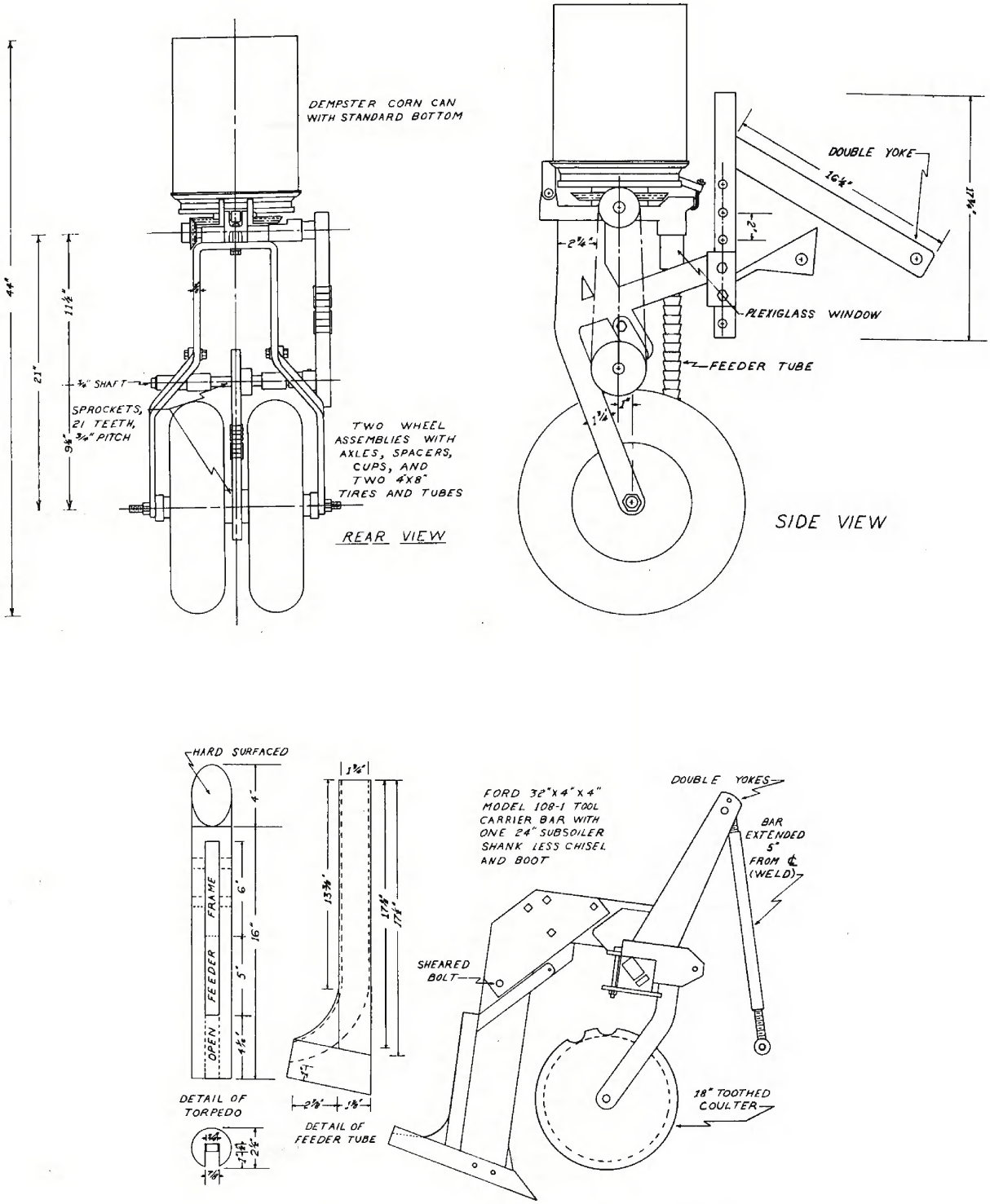

Figure 3.--Parts of the burrow-builder.

Figure 4.--Artificial burrow intercepting natural pocket gopher burrow.

Figure 5.--Field near Livermore, Colorado, after treatment with burrow-builder, showing surface disturbance.

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